

Appl. No.: 10/014,733
Amdt. Dated: 09/12/2005
Off. Act. Dated: 06/13/2005

REMARKS/ARGUMENTS

Reconsideration of this application is respectfully requested in view of the foregoing amendments and discussion presented herein.

1. **Rejection of Claims 1-20 under 35 U.S.C. § 102(e).**

Claims 1-20 were rejected under 35 U.S.C. § 102(e) as being anticipated by Greenfield et al. (U.S. No. 5,760,836).

Claims 1, 9, 19 and 20. Claims 1, 9, 19 and 20 are the independent claims in this application.

A number of key distinctions exist between the Greenfield '836 reference and the instant application, which should be fully appreciated in recognizing the invention as a whole. In this present response Applicant's counsel endeavors to bring these elements out with greater particularity in both the amended claims and arguments presented herein.

Although applicant did not necessarily agree with considering Greenfield as an anticipatory reference, the claims herein have been amended within this response to recite with greater particularity important aspects of the invention, which more clearly distinguish over the cited reference.

Before delving into the particulars of the specific Claims in the application, the following provides an overview of the numerous distinctions between Greenfield and the instant application.

First, the patent to Greenfield describes a coded video buffer as the encoder output buffer that fills up with compressed image data until no further data can be written to the buffer, as described in the summary on column 1, line 66 through column 2, line 1: *"This invention monitors the fullness of the FIFOs and adjusts the bitrate coming from the encoder into the FIFOs in order to prevent the FIFO buffer from overrun"*.

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However, the instant application addresses the uncompressed video buffer as the encoder input buffer. Refer, for example, to paragraph [0022] of the instant application where is described how good quality encoding cannot be achieved if the input to the encoder is being overrun.

Second, to avoid the overflow in the encoder output buffer, the Greenfield patent teaches using a feedback path from the buffer to the quantization block of the encoder wherein the output from the encoder can be quantized differently in response to the hardware FIFO buffer reaching a given fullness level. This is seen in FIG. 1 with feedback coming from FIFO 51 back to quantizer 23 before variable length coder 25, and is described throughout by Greenfield.

However, within the instant application where the encoder input buffer overflow is to be prevented a special catch up mode is taught for the encoder itself and the controller can choose normal encoding or catch-up encoding based on the encoding timing and CPU cycle resources.

Third, Greenfield describes a system in which the output section of the encoder itself adjusts for fullness of the output buffer, as described in the ABSTRACT: *"Method and apparatus for encoding a digital video image stream in an encoder. ...This bitstream is passed to and through the FIFO buffer to the transmission medium."*

However, in the instant application the system controller selects the encoder modes and the encoder just follows the system command.

Fourth, Greenfield teaches a solution to "*buffer overrun*" of the output buffer based on fullness of this buffer, as described in column 2, lines 7-20. It should also be noted that the FIFO buffer of the Greenfield approach utilizes an "*actual buffer ...requiring a finite number of machine cycles for loading and unloading*". (see Field of Invention in col. 1, lines 8-16). Greenfield and the MPEG specification refer to "data overrun" within a buffer.

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However, the instant application is not based on overrunning the physical FIFO buffer at all, but instead introduces a "time overrun" approach applied to the input of the encoder. "Time overrun" means that the encoding process for one frame received at the input of the encoder required more than one frame period to complete. The concept of "time overrun" is not even applicable to hardware encoders as described by Greenfield, or more particularly to an actual buffer. It should be appreciated that hardware encoders as described by Greenfield require a constant processing period for each frame of the stream regardless of the complexity. The complexity being largely determined by the nature of the input video contents. Yet in a software encoder the processing period can vary significantly in response to the complexity of the input video contents.

Consequently, Greenfield deals with "data overrun" at the output of the hardware encoder, whereas the instant application deals with "time overrun" at the input of a software encoder.

Fifth, Greenfield describes feeding back an output buffer fullness measure back to the quantizer at the output of the encoder to alter the quantization rate of video data being received in the hardware FIFO.

However, the instant application operates at the front end of the encoder and is based on the time required in the encoding process. A controller changes the modes of the encoder in response to time overruns.

The following will discuss the shortcomings for each of the pending claims in the instant application.

Claim 1. Independent amended Claim 1 is a method claim drawn to a method of preventing time overrun of an audio-video encoder.

The rejection equated the prior claim language to the teachings of Greenfield '836 and listed sections of the Greenfield '836 reference as support. The differences

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between Greenfield teachings and the claims are described in the following.

Greenfield does not teach a method which includes “*determining an encoding time overrun*” as recited in Applicant’s amended Claim 1. More particularly, the time overrun is described in amended Claim 1 as “*within which the encoding process for at least one of the frames received at the input of the encoder required more than one frame period to complete*”. Greenfield is directed at determining “*data overruns*” in FIFO buffer 51, as seen in FIG. 1 and discussed throughout the reference.

In addition, Greenfield does not disclose “*determining the severity of the time overrun based on the time taken by the encoder to process frames*”. Greenfield does not deal with the time taken during encoding. This is not surprising since Greenfield is directed toward a hardware encoder which has a fixed processing time regardless of complexity. Greenfield is interested in frame bits overflowing the FIFO buffer.

Furthermore, Greenfield does not deal with changing encoding methods to “*process the current frame in equal to or less than a frame period*” in response to the complexity of the sequences of frames arriving in the bitstream, such as determined in response to the severity of the encoding time overrun.

Consequently, Greenfield does not teach numerous aspects of Applicant’s Claim 1. To provide adequate support for an anticipation rejection, every claim element must be taught or inherent in a single prior art reference, Manual of Patent Examining Procedure (MPEP) §706.02a. The amended claims are not anticipated therefore by the relied-upon references.

Therefore, the rejection of Claim 1 and the claims which depend therefrom should be withdrawn.

Claim 9. Independent amended Claim 9 is drawn to “*a system for encoding audio-video data*”.

Amended Claim 9 recites many system aspects which provide similar steps as

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that recited in Claim 1 which are not anticipated by Greenfield. The elements of the amended claim can be seen in FIG. 4 and elsewhere, describing encoder 402, catch-up controller 404, and time overrun detector 414. It should be noted that the instant application does not teach controlling the fullness of the hardware buffer at the output of the encoders (although such is not precluded in addition).

It should be noted that *"catch-up controller"* provides *"multiple catch-up modes"*. The catch-up modes comprise *"encoding incoming frames at equal to or less than a frame period"*. Neither of which are taught by Greenfield.

Furthermore, Greenfield does not teach a time overrun detector, or any elements whatsoever for detecting encoding timing. And more specifically, Greenfield does not disclose *"changing encoding modes to change the time taken by the encoder to process frames"* to control time overruns.

Therefore, Greenfield does not anticipate Claim 9 and the rejection of Claim 9 and the claims which depend therefrom should be withdrawn.

Claims 19 and 20. Independent Claims 19 and 20 recite a system of audio-video encoding or a computer readable medium for performing the same. Both claims are written in a means-plus-function format. Claim 20 describes the medium as *"computer readable medium comprising instructions, which when executed on a processor, perform a method..."*.

Both of these claims recite (1) means for encoding, (2) means for reducing time required to process a frame, and (3) means for determining time overruns and activating catch-up modes.

Greenfield does not describe a *"means for reducing the time required for the encoder to process a frame"*, but only changes the quantization as the frame data is loaded into the FIFO buffer.

Greenfield does not determine time overruns of the encoder, but only changes

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the output of the encoder in terms of the size of each frame loaded into the FIFO buffer.

Therefore, independent Claims 19 and 20 are not anticipated by Greenfield, wherein the rejection of Claims 19-20 and the claims which depend therefrom should be withdrawn.

Consequently, Applicant respectfully submits that amended independent claims 1, 9, 19 and 20 recite elements which are not found in the relied upon Greenfield reference, wherein these claims, and the claims which depend therefrom, are not anticipated and the rejection should be withdrawn.

2. Claims 1-20 are nonobvious.

Nor would the subject matter of Claims 1-20 be obvious to a person having ordinary skill in the art in view of Greenfield '836 in combination with another reference or what is known in the art. Greenfield does not teach controlling the encoding time of the frames, but only the quantization (size) of the output so that the physical buffer is not overrun such that a different object and principle of operation are being taught.

Therefore, since there is no way to provide catch-up modes from the Greenfield reference, and because different objects and principles are espoused, Claims 1-20 accordingly recite elements which would be non-obvious over any combination with Greenfield '836 for purposes of 35 U.S.C. § 103.

3. Amendment of Claims 1, 3, 8-20.

Claim 1. Independent Claim 1 was amended in a number of ways to recite the invention with greater particularity, including the following changes.

The overrun was clarified as being of "encoding time"; support found such as in paragraph [0004] and [0016].

The encoding time overrun is described as being "*within which the encoding process for at least one of the frames received at the input of the encoder required*

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more than one frame period to complete". Support is found such as in paragraphs [0016] - [0021], [0033] and so forth.

The severity of time overrun is "*based on the time taken by the encoder to process frames*", support is found in the specification including paragraphs [0040], [0048], [0050]-[0051], and so forth.

The encoding of a current frame includes processing the "*current frame in equal to or less than a frame period toward reducing encoding time overrun in response to the severity of said encoding time overrun*"; support for which is found in the specification such as in paragraphs [0016], [0033], [0040], [0053] and so forth.

Claim 3. Dependent Claim 3 was amended to recite the element of independent claim 1 to which it applies.

Claim 8 and 16. Dependent Claims 8 and 16 were amended to recite a couple of catch-up encoding methods that can be utilized separately or in combination. Support for which is found in the specification, including paragraph [0053] and so forth.

Claim 9. Independent Claim 9 was amended to reorder and expand on the recited elements.

The catch-up controller is described to support "*multiple catch-up modes*", and which is "*for encoding incoming frames at equal to or less than a frame period*". These aspects are supported in the specification including paragraphs [0016], [0040] and so forth.

A "*time overrun detector*" is recited for "*changing encoding modes to change the time taken by the encoder to process frames thereby controlling time overrun in said encoder*" as recited in the specification such as in FIG. 4 element 414, and paragraphs [0048], [0049] and so forth.

Claims 10-15. Dependent Claims 10-15 were amended to more properly recite aspects as "*configured for*" rather than actively stating the function.

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Claim 17. Dependent Claim 17 was amended to recite aspects of the catch-up modes as *“said catch-up modes can be selected which reach encoding completion in less time than the normal encoding mode which does not limit encoding to complete in a single frame time”*. Support for which is found in the specification including paragraphs [0016], [0020], [0033], [0040] and so forth.

Claim 18. Dependent Claim 18 was amended to recite additional aspects of an embodiment using two catch-up levels, as supported by the specification including paragraphs [0016], [0040], and so forth.

Claim 19-20. Independent Claims 19-20 were similarly amended to recast the means elements for improved clarity. Referring for example to FIG. 4, the elements are cast as follows: *“means for encoding a frame”* as element 402, *“means for reducing time required for encoder to process a frame”* as element 404, *“means for determining time overruns”* as element 414. These elements are similar to those previous recited but include additional detail and a new ordering.

4. Amendments Made Without Prejudice or Estoppel.

Notwithstanding the amendments made and accompanying traversing remarks provided above, Applicant has made these amendments in order expedite allowance of the currently pending subject matter. However, Applicant does not acquiesce in the original ground for rejection with respect to the original form of these claims. These amendments have been made without any prejudice, waiver, or estoppel, and without forfeiture or dedication to the public, with respect to the original subject matter of the claims as originally filed or in their form immediately preceding these amendments. Applicant reserves the right to pursue the original scope of these claims in the future, such as through continuation practice for example.

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5. Request for Continued Examination.

A proper fee is enclosed for a Request for Continued Examination (RCE) of this case under 37 CFR 1.114.

6. Conclusion.

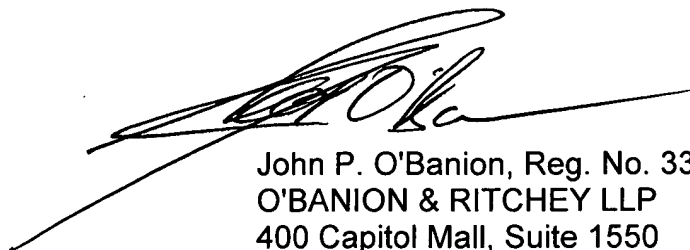
In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue.

The Applicant also respectfully requests a telephone interview with the Examiner in the event that there are questions regarding this response, or if the next action on the merits is not an allowance of all pending claims.

Date: _____

9/12/05

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'John P. O'Banion', with a long horizontal line extending to the right.

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CERTIFICATION UNDER 37 CFR 1.8

I hereby certify that the foregoing:

Amendment

is being deposited with the United States Postal Service on 9/12/05
with sufficient postage as first class mail in an envelope addressed to the:
Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

JOHN P. O'BANION

(Type or print name of person mailing paper)


(Signature of person mailing paper)